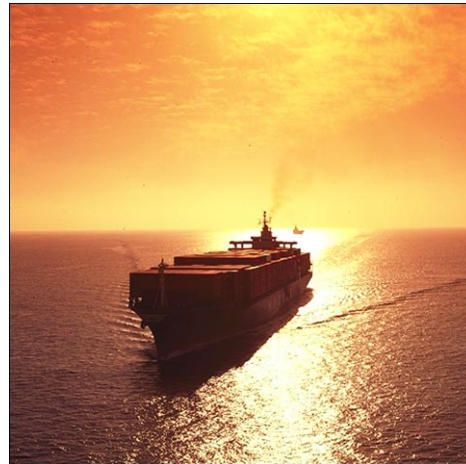


The Development of a Global Maritime Emissions Inventory Using Electronic Monitoring and Reporting



**18th International Emissions
Inventory Conference
April, 2009**

**Dale Neef PhD
DNA Maritime LLC**

Corporate social responsibility comes to maritime shipping

Growing realisation industry needs to move with times by formulating CSR policies and implementing self-regulation

EARLIER this year, I read with interest the article 'It is time to take action to make a major and permanent improvement in shipping's standing and image' from Det Norske Veritas. It was important because it reflects the growing realisation that corporate social responsibility and industry self-regulation is an up-and-coming issue in maritime shipping.

FirstPerson

Dale Neef



Lloyd's List

Insight & Opinion



COVER STORY



CSR comes to ports and harbors

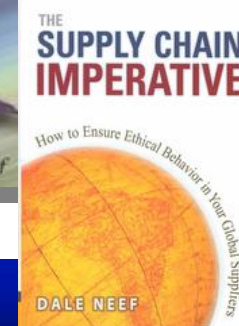
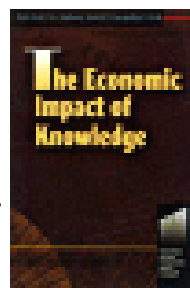
The maritime industry is the latest to get used to the concept of the triple bottom line. As **Dale Neef** reports, ports face special issues raised by customers and local communities

Environmental Issues

BUNKERSPOT
INDEPENDENT INTELLIGENCE FOR THE GLOBAL BUNKER INDUSTRY

Risk and responsibility

Dale Neef contends that ships will continue to be found guilty of discharging oil illegally until owners and ships management decide to adopt a formal Corporate Responsibility and Risk Management framework that monitors environmental, safety and security issues at a shipboard level



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On the Tipping Point of an Environmental Upheaval in Shipping...

1. Maritime shipping is a significant source of air pollution and GHG emissions
2. Abatement is relatively straight-forward (less-polluting fuel, speed reduction, filtering technologies, better engine/architectural design, cold ironing)



But, unlike land-based emissions industries, maritime has problems with:

- **Enforcement:** While the need, enforcement capabilities, and political will are local, the industry and policy-making apparatus is global
- **Accounting and Reporting:** Rudimentary methods for reporting mean little company-level accountability and poor emissions inventories
- **Incentives:** Beyond regulatory compliance, the industry has little incentive to improve (penalty or reward)

Emissions: Suddenly Shipping is in the Headlines...

- “Average ship burning bunker fuel equals the same pollution as 2,000 cars”
- “One ship at berth can generate one ton of NOx and almost 100 pounds of particulate matter in a day...”
- “Pollution released from ships visiting the ports of LA and LB in a single day is roughly equivalent to 1,000,000 cars...”
- “Shipping-related PM emissions are responsible for 60,000 cardiopulmonary and lung cancer deaths annually, with most deaths occurring near coastlines in Europe, East Asia, and South Asia (annual mortalities could increase by 40% by 2012)”



Not Just Sulfur...

- UN's Intergovernmental Panel on Climate Change in 2008: true scale of climate change emissions (CO₂) from shipping is almost three times higher than previously believed...1.12bn tonnes of CO₂ each year; nearly 4.5% of all global emissions of CO₂

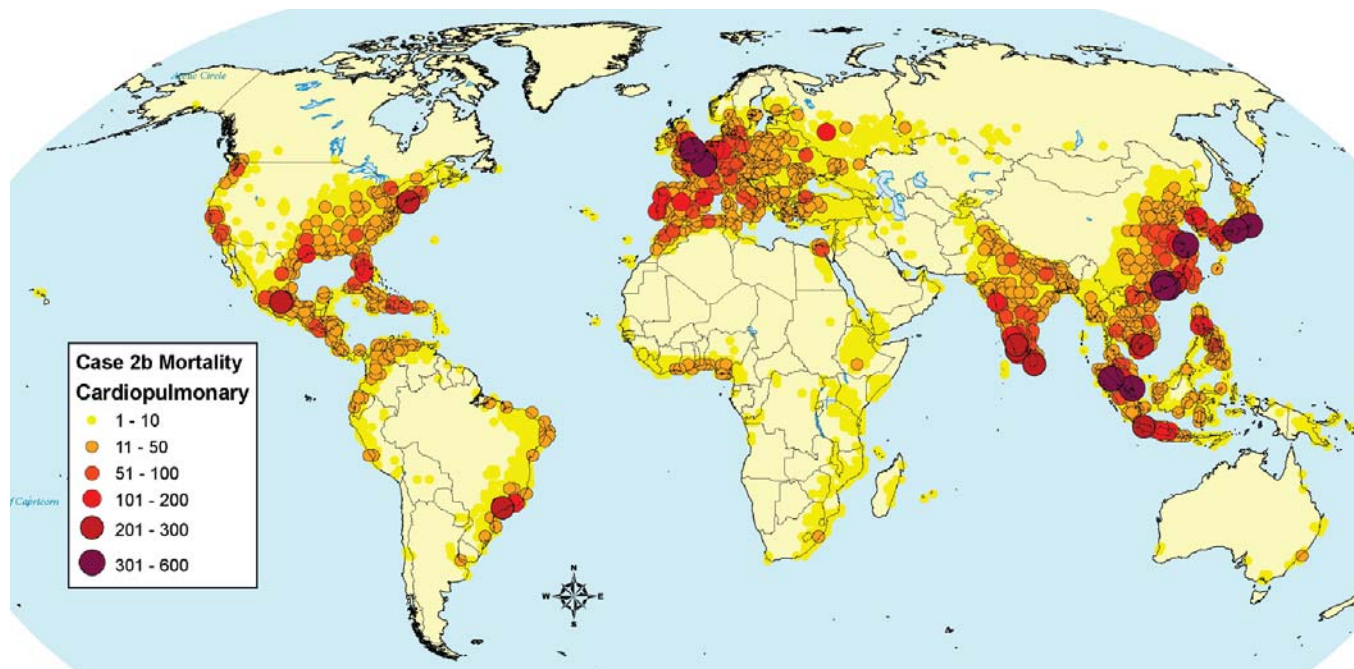
(The aviation industry, under heavy pressure to clean up, is responsible for about 650m tons of CO₂ emissions a year - just over half that from shipping...)

- “Maritime CO₂ emissions to grow 30% by 2020”
- “Moller-Maersk shipping creates as much CO₂ emissions from its operations (40-50 million tonnes) as the entire country of Denmark.” - *Guardian*



Deadly Emissions...

- More than 70% of shipping traffic takes place within 250 miles of the coastline
- 40 major U.S. ports, home to 87 million people, are in areas that violate air quality standards.



Cardiopulmonary mortality attributable to ship PM emissions worldwide...

- Dr. James J. Corbett and Dr. Paul Fischbeck

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Shipping Emissions

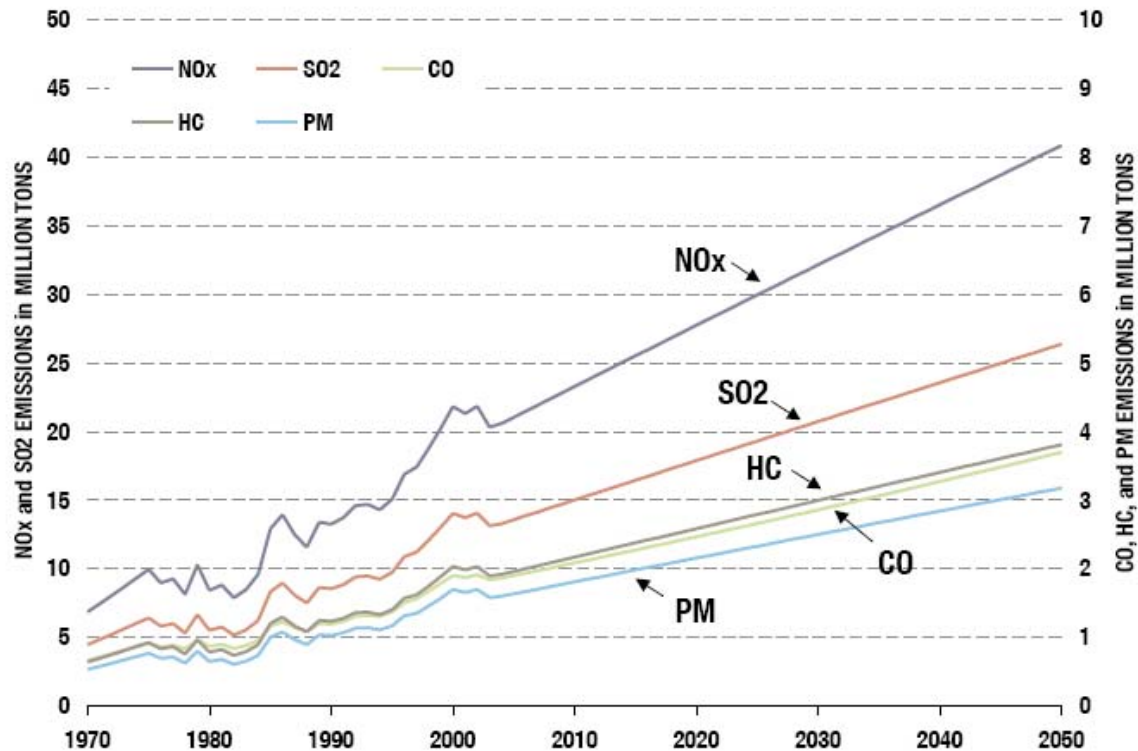


FIGURE 11. NO_x, SO₂, CO, HC, and PM Emissions from International Shipping: 1970–2050

Environmentally and politically unsustainable...

What is being done?

Until now, primarily SO₂ -focused (fuel type and usage)

- IMO - Ships should switch to marine distillate fuels of 1 percent sulfur or less by 2010 and to .5 percent by 2015
- SECAs: Baltic, North Sea, English Channel, etc. = 0.1 percent sulfur content in fuel by 2015,
- US ratified Annex VI / North American ECA
- Regulators, communities and ports pressing for:
 - reduced speed (VSR program)
 - low sulfur fuel incentive programs (Green Flag)



New high-level pressures to curb GHG emissions ...

- Likely to see shipping included in revision of Kyoto Protocol in Copenhagen
- Inclusion of maritime emissions in the EU Environmental Trading Scheme carbon dioxide cap-and-trade system by 2010
- January 2009, Ministerial Conference on Global Environment and Energy (21 countries) called on the IMO to begin new emissions talks by 2010.
- February 2009 IMO secretary general Mitropoulos stressed the need for IMO to take action on greenhouse gases - theme for this year's World Maritime Day is "Climate change: a challenge for IMO too!"
- New leadership + funding
- Obama Administration pushing states rights on automobile emissions (California and 13 other states on auto emission and fuel efficiency standards)



What about GHGs?

Fuel and technology improvements:

- Fuel: natural gas, hybrid electric
- NOx: Engine tuning and conversion: 85% of present 2011; 20% in ECAs by 2016
- Cold Ironing technologies
- Design and engine improvements
- Selective catalytic reduction and particulate matter filters



Real progress for NO_x and SO_x, but What About GHGs?

Over the next several years:

- Rapid shift from voluntary to mandatory programs for emissions abatement
- Low sulfur fuel trade-off with scrubber technology and speed reduction

But...

- GHGs: Where is the broader incentive for the industry to improve if shipping companies and individual ships can't be held accountable or be rewarded for good behaviour?

The GHG Dilemma...

Options:

- **Fuel tax:** difficult politically/enforcement/incentives
- **Cap-and-Trade:** No accurate GHG emissions data by ship type, engine, load, speed, etc. How to assign liabilities? How to pay credits?
- **Reduced dockage fees/green passports, etc.:** But how to measure?

... Whatever the solution, we need to monitor and measure GHG performance at the ship level.



The Maritime Emissions Inventory Dilemma

The problem is that unlike land-based industries:

- Paper-based, good-faith reporting, high admin. costs, disputes, difficult enforcement and low compliance
- No standardized method for measuring and reporting a ship's GHG emissions output (IMO's Energy Efficiency Design Index and ship energy management plan) but little reliable ship data
- No accepted emissions inventory or performance baseline that will allow authorities to set emissions performance baselines for financial incentives, rewards or emissions credits/debits
- Port emissions inventories are often piecemeal and port or program specific.



The Monitoring and Reporting Dilemma

Result:

- No standardized or collaborative effort (beyond fuel-usage rules) to put downward pressure on maritime GHG emissions
- Additional administrative and enforcement burden on local authorities
- Shipping companies are likely to find emissions liabilities assigned to their books with little ability to respond
- Progressive shipping companies end up subsidizing poor performers and getting no credit for environmental improvements themselves

Can't cap, tax or encourage improvements unless you can accurately measure and compare **expected vs real performance at a ship level...**

What is the Solution?

A framework for accurate emissions accounting for the maritime industry:

- Emissions and fuel monitoring equipment on ships
- Electronic monitoring and reporting of ship performance: speed, location, type of fuel, engine size, engine load, emissions output
- All output available on a central database (PERCS) via the Internet
- Creation of empirical ship emissions inventories and performance baselines

Electronic Monitoring

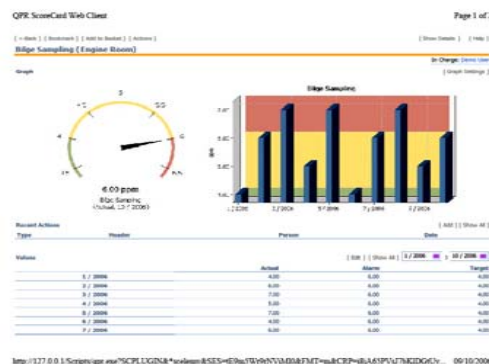
Electronic Onboard Data Collection...

- 70% of all the data required for regulatory compliance can be captured automatically and electronically from systems onboard the ship without human intervention:
 - Location, speed, load factor, fuel usage
- Handhelds can electronically capture the rest...

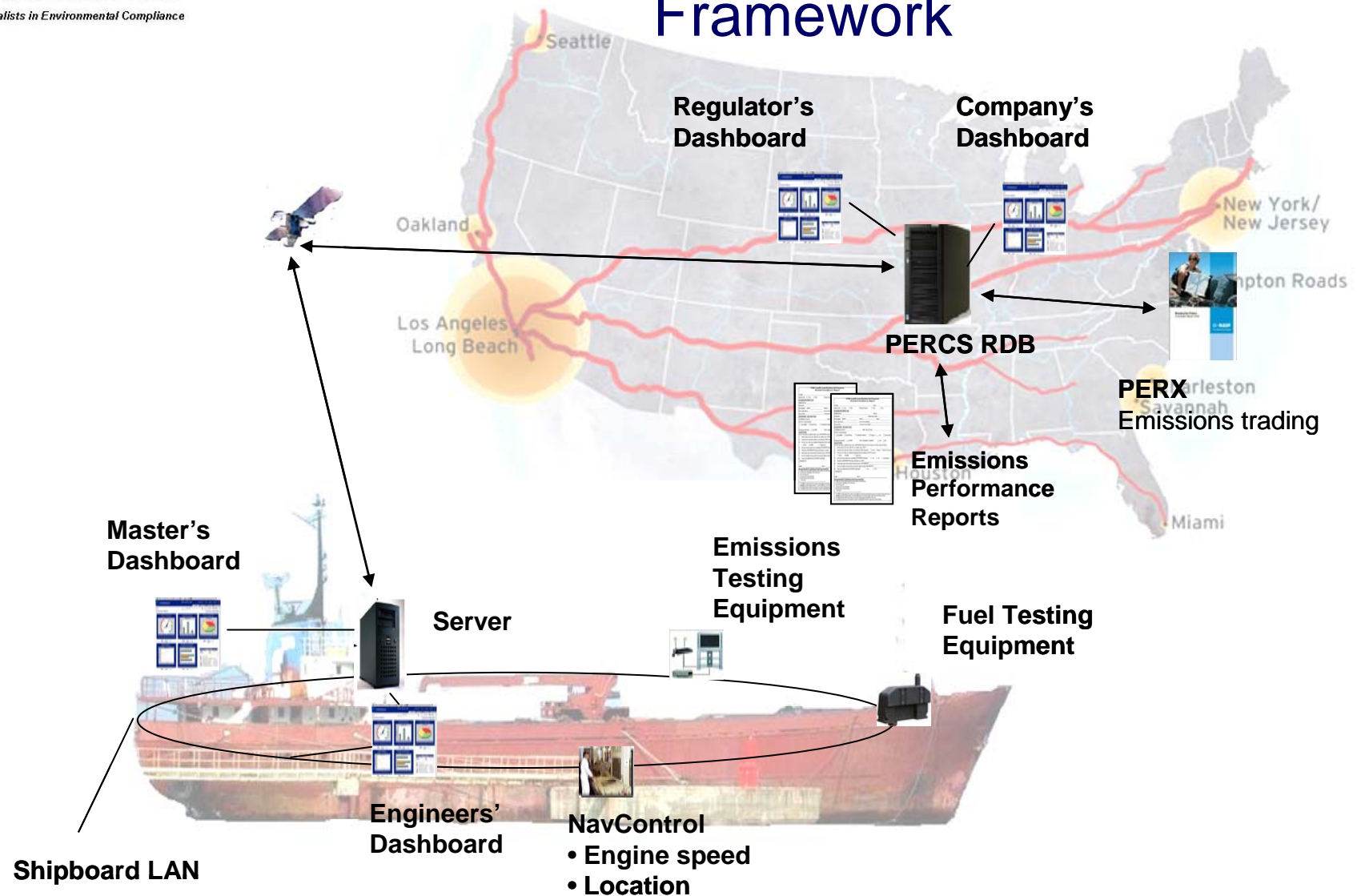


Rapidly Evolving Monitoring and Reporting Technologies...

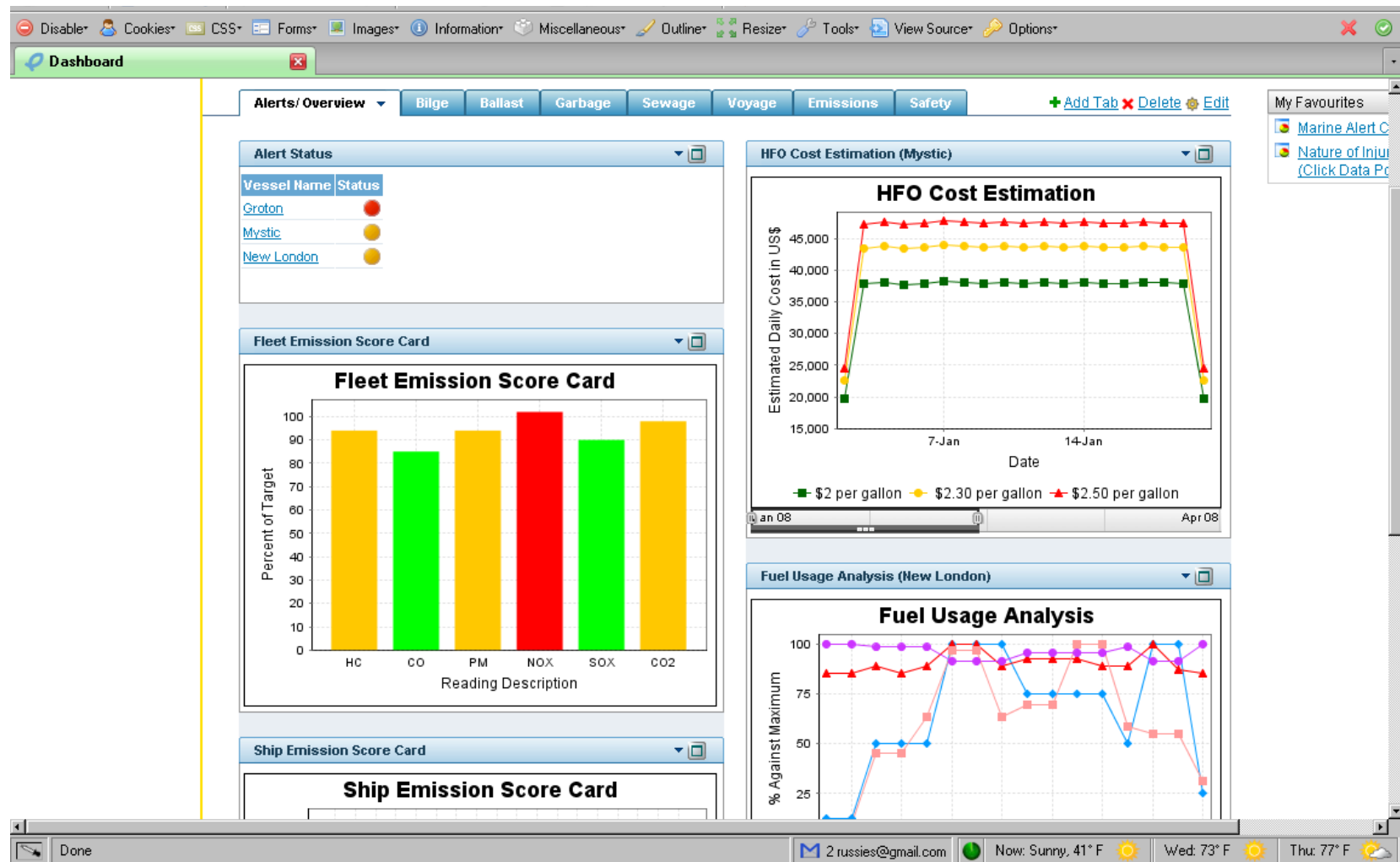
- Emissions monitoring equipment
 - Emissions monitoring
 - Formula-based emissions extrapolation sw
 - Inline fuel monitoring (lab-on-a-ship technologies)
- Internet-based Maritime Emissions Database Portal
- Dashboards and Performance Calculation SW



Maritime Electronic Monitoring and Reporting Framework



SW for Monitoring Emissions and Fuel Usage

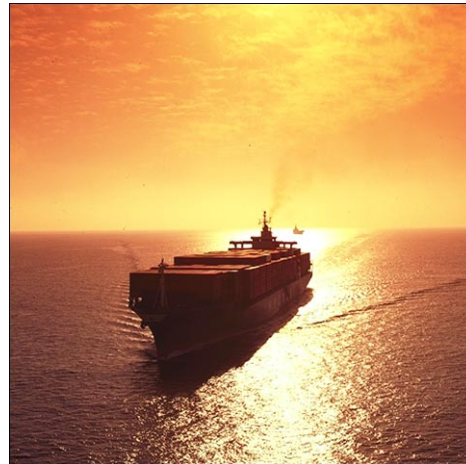


Benefits of Centralized Database Inventory and Electronic Monitoring and Reporting Framework...

- Absolute accuracy of reporting
- Relieves crew/regulatory authorities and ports of paperwork and disputes
- Provides the company with valuable commercial/operational information
- Provides regulatory authorities with access to company performance and compliance records electronically
- Collects empirical evidence (an Emissions Inventory) for setting performance baseline for emissions control and emissions trading schemes

...Not even expensive or difficult to implement – Need political will and industry leadership...

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